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Gender and Modern Supply Chains in Developing Countries

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Abstract

The rapid spread of modern supply chains in developing countries is profoundly changing the way food is produced and traded. In this paper we examine the gender implications in modern supply chains. We conceptualize the various mechanisms through which women are directly affected, we review existing empirical evidence and add new survey-based evidence. Empirical findings from our own survey suggest that modern supply chains may be associated with reduced gender inequalities in rural areas. We find that women benefit more and more directly from large-scale estate production and agro-industrial processing, and the creation of employment in these modern agro-industries than from smallholder contract-farming.

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Gender and Modern Supply Chains in Developing Countries

1. Introduction

During the past couple of decades the integration of developing countries in global markets accelerated with increased participation in international trade and growing FDI inflows. This has resulted in rapid change in developing countries' agri-food systems with rapid expansion of so-called modern food supply chains (Swinnen, 2007). These modern supply chains comprise the production and trade of high-value produce, usually destined for export to high-income markets or for supermarket retail in high-income urban market segments. Modern supply chains are expanding rapidly across developing regions as global trade in high-value non-traditional agricultural products – such as fresh food and vegetables, fish and seafood products – is increasing sharply and increasingly originates from developing countries¹ (Aksoy and Beghin, 2005) and as supermarkets are spreading rapidly across developing countries and regions (Reardon et al., 2003). The governance of modern supply chains is characterized by the use of high standards to govern quality and food safety throughout the chains, high levels of vertical coordination – including contract-farming – in the chains, a high degree of consolidation of the supply base and agro-industrial processing whereas traditional food supply chains in poor countries are governed through spot market transactions involving a large number of small traders.

While there is consensus that the emergence and spread of modern food supply chains is profoundly changing the way food is produced and traded in developing countries, with important effects for rural households in these countries, there is still debate on the welfare implications. Some studies show that the expansion of modern supply chains increases rural incomes and alleviates rural poverty (Maertens and Swinnen, 2009; Swinnen, 2007). Other reports have argued that

modern supply chains bring about adverse development effects and exacerbate existing inequalities in rural areas of developing countries because the poorest farmers may be excluded or exploited by large, often multinational, companies dominating the chains (Key and Runsten, 1999; Farina and Reardon, 2000; Reardon et al., 1999).

An issue which has received little attention so far in the discussion on modern supply chains and welfare is gender. This is surprising since women play a very important role in agriculture in poor countries. Yet, the gender effects of high-value agri-food trade and modernization of supply chains remains an almost unexplored issue. Only very few studies have taken gender into account in the analysis of modern supply chains (Fontana et al., 1998). Dolan (2001) points to the fact that female farmers are disadvantaged in contract-farming schemes in the Kenyan export horticulture sector and Barrientos, Dolan and Tallontire (2001, 2003) indicate that female farm workers are exploited in the South African deciduous fruit sector. Although these studies identify important gender-related aspects of modern supply chains, they each deal with different issues and lack representative survey-based evidence to support their conclusions. There is a need for a more comprehensive view on the gender implications of modern supply chains and for better empirical evidence to quantify the effects.

The objective of this paper is to make a first attempt at better understanding the gender implications of the growth in high-value agricultural production and trade and the associated modernization of agri-food supply chains. The paper does so in three ways. First, we analyze and conceptualize the various channels through which women are affected by the emergence of modern supply chains. Second, we review existing empirical evidence and add new survey-based evidence from two studies of high-value horticulture supply chains in Senegal in an attempt to quantify specific

gender effects. Third, we identify a series of questions and issues on which there is no – or very little – empirical evidence and which require answering before one can make conclusive assessments of the gender impact of modern supply chains in developing countries. Our review focuses mainly, although not exclusively, on high-value horticulture supply chains in Sub-Saharan Africa (SSA). This focus is of particular relevance because horticulture supply chains have been highly dynamic and strongly affected by processes of globalization and modernization (Aksoy and Beghin, 2005; Swinnen, 2007) and because gender inequality is a very important issue in SSA (Quisumbing and Mc Clafferty, 2006).

The paper is structured as follows. In the next section we develop a conceptual framework and identify several key gender-related issues of modern supply chain growth. In section three we present two original case-studies used throughout the paper, including details on primary data collection. In section four we assess the implications of modern supply chains for intra-household allocation of resources and control over income. In section five we deal with the implications of modern supply chains for rural labor markets and discuss in particular the feminization of these markets and gender discrimination in these markets. In a final section we summarize our conclusions and identify several unresolved issues and areas for further research.

2. A conceptual framework

The currently available literature on gender implications of modern supply chains is not only very limited but also lacks coherence and a comprehensive structure. In this section we describe a conceptual framework, depicted in figure 1, which integrates insights on how modern supply chains are governed and how – depending on the governance structure – rural households benefit directly from

modern supply chains, and enables a more adequate assessment of intra-household and gender issues in modern supply chains.

It is important to note that initially we focus only on the direct effects of modern supply chains and ignore possible spillover effects through indirect and more complex causal linkages². We do so in order to keep the analysis focused on summarizing the main effects and compiling existing and new evidence. However, indirect effects and complex causal linkages are potentially important and we come back to them when identifying unresolved issues and areas for further research.

Supply chain governance

The modernization of food supply chains entails important structural changes in the food supply system. First, modern supply chains, such as FFV export supply chains and supermarket-driven fresh food chains, are increasingly governed through stringent food standards, including public regulations as well as corporate standards. Second, modern supply chains usually entail a certain degree of consolidation and the involvement of agro-industrial firms or large buyers. This consolidation can happen at the level of food processors, exporters or food distributors but also at the level of primary production. Third, rather than being based on spot market transactions modern supply chains entail varying levels of vertical coordination at different nodes in the chains. This is most apparent in the form of contract-farming between agro-industrial firms or food distributors and primary producers. In the most extreme case, primary production is completely vertically integrated in upstream processing and trading activities. Fourth, vertical coordination in modern supply chains often involves some kind of market interlinking. This implies that transactions are carried out in multiple markets (Swinnen and Vandeplas, 2007); for example the delivery of

inputs and credit to farmers by food companies in return for supplies of primary produce under contract-farming arrangements.

There are large variations in the degree of supply base consolidation, the extent of agro-industrialization, the level of vertical coordination and the occurrence of market interlinking across countries and sectors³ (Swinnen and Maertens, 2007). These variations determine the way in which rural households in developing countries are directly connected to and gain from high-value supply chains; either through product markets or through labor markets. First, farm-households have been affected through the production and marketing of high-value produce in contract-farming schemes with the agro-industry. Farmers generally gain from participation in high-value contract-farming schemes through enhanced access to inputs, reduced production and marketing risk, improved technology and productivity, and ultimately higher incomes – which has been empirically demonstrated by various authors (e.g. Birthal et al., 2005; Gulati et al., 2007; Minten et al., 2009). Second, if high-value supply chains are characterized by contracting with large commercial farms or by vertically integrated estate production, or if labor-intensive post-harvesting and processing is needed – e.g. because of increased requirements for sorting, grading, washing, labeling etc. incorporated in public regulations and private standards – local households gain through employment and labor market effects. Empirical studies have demonstrated that it is especially through labor market effects that the poorest households benefit from the growth in high-value trade and modern supply chains (e.g. Maertens and Swinnen, 2009; Maertens et al., 2008; McCulloch and Ota, 2002; Barron and Rello, 2000).

Intra-household and gender issues

There are two channels through which rural households are directly connected to and gain from high-value supply chains; either through product markets (contract-farming) or through labor market (agro-industrial employment). A first important intra-household issue is whether there are gender differences in who is contracted⁴ by the agro-industry, either as part of a production contract or as part of a labor contract. Such gender differences may affect the allocation of productive resources – including land, labor, and capital – in the household and the intra-household control over incomes generated from production and labor contracts with the modern agro-industry.

In a unitary household framework these issues would not matter and the sole question would be the impact on total household income. However, individual household members likely have different preferences and do not necessarily pool resources (Ellis, 1998). It has for example been observed that income controlled by women has a superior development impact because such income is more likely to be associated with improved child nutrition, and increased spending on children's education, health care, etc (Quisumbing and Mc Clafferty, 2006). So, in a collective household framework participation of women in modern supply chains and female control over income derived from modern supply chains matters as this might be positively associated with broader development goals.

Second, the growth in modern supply chains has been associated with increased rural employment opportunities, especially where high-value production is organized around large estate farms and where labor intensive post-harvest handling and processing is required. The employment effects of modern supply chain growth raise issues concerning the degree of feminization in these labor markets and the existence of gender discrimination in these labor markets. Feminization of labor

markets in developing countries is generally perceived as a favorable gender impact as labor market participation is positively correlated with women's well-being, increases women's economic independence and enhances their empowerment, which are in itself important objectives of gender equality (Quisumbing, 2003; Zhang et al., 2004). In addition women's control over income resources in the household is strongly determined by women's access to labor markets and paid employment (Quisumbing, and Mc Clafferty, 2006).

However, women are generally found to be disadvantaged in rural labor markets (Lanjouw and Feder, 2001; Lanjouw and Lanjouw, 2001; Woldehana, 2005). Cultural, social and religious norms often prevent women in rural areas of developing countries from taking advantage of off-farm opportunities and work outside the home and the family-farm (Lanjouw and Feder, 2001; Haggblade et al., 1988). Women – especially in African rural societies – are more often concentrated in subsistence food crop production, household maintenance activities (such as fetching water and fuel wood), and low-return off-farm economic activities inside the home (such as food processing, pottery, weaving, etc.) than in wage labor outside the house (Lanjouw and Lanjouw, 2001; Lanjouw and Feder, 2001; Quisumbing and Mc Cafferty, 2006; Woldehana, 2005). Moreover, even if women are able to participate in rural labor markets, they might be disadvantaged because of gender discrimination in wages and work conditions, as has been empirically documented in some studies (e.g. Canagarajah et al., 2001; Lanjouw and Feder, 2001).

Feminization and gender discrimination in labor markets have mostly been addressed regarding urban markets and manufacturing sectors while insights from rural sectors are very limited (Fontana et al., 1998; Zhang et al., 2004). A focus on

modern supply chains and resulting female employment in high-value agro-industrial production and agro-processing might remove this sectoral bias in gender studies.

Within this framework, several gender-related questions are addressed in the next sections. First, we address the gender differences in contracting in modern supply chains and the associated intra-household use and control over resources and income. Second, we specifically analyze whether it makes a difference from a gender perspective if rural households participate in and benefit from modern supply chains either through product market channels and contract-farming or through labor market channels and agro-industrial employment. Third, we analyze the effects of modern supply chains on rural labor markets. We discuss the implications of modern supply chain growth towards feminization of rural markets and assess the presence/absence of gender discrimination in these labor markets.

3. Case-studies and data

Case-studies

To empirically document and quantify the gender implications of the spread of modern supply chains in developing countries, we use insights from two case-studies of high-value horticulture export supply chains in Senegal. Fresh fruit and vegetable (FFV) exports from Senegal to the EU have increased tremendously in the past 10 years: from 4,800 ton in 1997 to almost 25,000 ton in 2006 (figure 2). The initial growth in the late 1990s was mainly in French bean exports while from 2000 onwards also the export of cherry tomatoes and mangoes has grown sharply. French beans and cherry tomatoes are the main crops accounting each for about one third of total FFV exports from Senegal. The two studies cover the main horticulture zones and the main horticulture export crops in Senegal: 1/ the area “*Les Niayes*” from where over 90% of

exported French beans originate and 2/ the “*Senegal River Delta*” area from where almost the entire volume of cherry tomato exports originates.

Data collection

We organized extensive primary data collection at different levels of the supply chains; including qualitative interviews with horticulture experts, farmers’ organizations and village representatives; quantitative interviews with FFV exporting companies; and a large and comprehensive household survey.

The quantitative firm-level interviews cover nine out of the 20 French bean exporting companies in “*les Niayes*”– interviewed in April 2005 – and the sole multinational company dominating tomato exports from the “*Senegal River Delta*” area – interviewed in September 2005 and March 2006. For the household survey 300 households were selected according to a stratified random sampling method for each of the case-studies⁵. Household surveys were conducted in August-September 2005 in “*les Niayes*” and in February-April 2006 in the “*Senegal River Delta*” area. The survey data – including recall data – provide details on household demographic characteristics, land and non-land asset holdings, agricultural production, off-farm employment, non-labor income, credit and savings; and allow calculating household net income from farm and off-farm sources. In addition, we collected detailed and recall information on the participation of each household member in horticulture export supply chains.

Horticulture supply chains

The two supply chains in our Senegal case-studies differ substantially in certain governance aspects. The cherry tomato supply chain⁶ is dominated by one

multinational company organizing the complete production and export of cherry tomatoes from the *Senegal River Delta* area. The company – a subsidiary of a French holding with food production and distribution affiliates in a number of countries in Europe, Africa and Latin-America – started investing in horticulture production and trade in Senegal in 2001. The export tomato chain is completely vertically integrated and local smallholder suppliers are completely excluded. The multinational holding aims at high-standards production and is certified by different schemes including EurepGAP, BRC (British Retail Consortium), ETI (Ethical Trade Initiative) and Tesco's Nature Choice.

Contrarily, the French bean supply chain⁷ involves several exporting companies in the *Niayes* region and is based partially on smallholder contract-farming and partially on vertically integrated agro-industrial production. Companies in this sector increasingly seek compliance with stringent EurepGAP standards: at the time of our interviews one the largest exporters in the sample was already EurepGAP certified and three others were in the processes of certification. As part of their strategy for attaining EurepGAP compliance these companies started their own integrated estate production, which is causing a profound shift in the governance structure of the French bean supply chain: the share of produce procured from local smallholder suppliers decreased from 95% in 1999 to 52% in 2005. Similar observations on supply chain restructuring have been observed in other studies as well, for example by Jaffee (2003) for Kenyan vegetable exports, by Minot and Ngigi (2004) for FFV exports from Cote d'Ivoire, and by Danielou and Ravry (2005) for pineapple exports in Ghana. Usually increasing food standards are mentioned as the main driving forces of these changes.

4. Participation in modern supply chains and intra-household effects

4.1. Female participation in modern supply chain

Contract-farming

Female farmers are mostly excluded from contracting with agro-industrial firms for the delivery of high-value produce. Although there are some examples of successful integration of women as contracted party in contract-farming schemes⁸, most of the scarce amount of available studies indicate that female farmers are largely excluded from high-value contract-farming. For example, Dolan (2001) observes less than 10% of female farmers in smallholder contract-farming schemes in the Kenyan FFV export sector and Eaton and Sheperd (2001) find that in large contract-farming schemes involving many thousands of farmers in China contracts were exclusively with men. Also, Porter and Philips-Horward (1997) report that in sugar contract schemes in South Africa the majority of contractors are men.

Our data on the French bean export sector in Senegal are in line with these findings. We find that only one out of the 59 contracted bean farmers is a woman, which is clearly the exception rather than the rule. Also our interviews with the exporting French bean companies confirm that they are strongly biased towards men in selecting contracted suppliers.

The reasons mentioned for this exclusion of female contractors in high-value contract-farming schemes relate to their limited access to productive resources. Women in developing countries are generally disadvantaged in the access to productive resources such as land, capital and credit, and in the access to information and technology (Temu, 2005). The preference of food companies to contract with men is driven by companies' need to secure access to land and labor for a guaranteed supply of primary produce (Dolan, 2001). Women are excluded because they lack

statutory rights over land⁹ and because they have less authority over family labor compared to their husband and male siblings. In the case of vegetable supply chains in Senegal women also lack claims to irrigation water and infrastructure – a crucial input for French bean contract-farming in the *Niayes* region – which further disadvantages them in contracting with the export industry.

Agro-industrial employment

The agro-industrial estates and agro-processing companies that govern modern supply chains employ a large number of workers. This is documented for the case of horticulture exports in SSA in table 1. The figures show that in many poor SSA countries, thousands of people are employed in the horticulture agro-industry. Part of this employment might concern urban jobs in processing units and pack houses but the lion's share is rural employment.

In sharp contrast to high-value contract-farming, there is no bias in favor of men in the labor market effects of modern supply chains. In fact, the data in table 1 show that a large share of the thousands of employees in the SSA horticulture agro-industry is female. From our own studies in Senegal we find that 90% of the agro-industrial employees in the French bean sector and 60% in the cherry tomato sector are female. Also in other countries the share of female laborers in the FFV agro-industry is particularly high; for example in the flower industry in Kenya and Uganda (75%) and the fresh vegetable sector in Zambia (65%).

The preference of agro-industrial firms to hire female workers has to do with the delicate work in harvesting and handling fresh produce for which women are better capable. In addition, women might be more efficient in certain tasks. For

example in the French bean sector in Kenya female farmers were found to do a much better job in harvesting, leading to substantially higher profits (Kimenye, 2005).

4.2. Intra-household allocation of resources

Rural households participating in modern supply chains through product market channels allocate (part of) their land, labor and capital resources to the production of the high-value commodity under contract with the agro-industry. Hence, high-value contract-farming has direct implications for the allocation of productive resources within the household. It has been argued that contract-farming with the modern agro-industry – and the exclusion of women from contracts – could give rise to intra-household conflicts over the allocation of land and labor resources between contract requirements and women's priorities with regard to food production (Sing, 2002). High-value contract-farming leading to a re-allocation of land and labor resources to high-value commercial production might result in decreased access to resources for female farmers concerned with subsistence food production, and ultimately lead to the deterioration of the food security situation of rural women and children (Baumann, 2000).

Convincing and quantitative evidence on this issue is lacking. What is available from descriptive studies is mixed and yields no consensus. Several authors point to the fact that – while men control the contracts as contracting party – the majority of the farm work done on contracted plots is performed by women as family laborers and thereby replacing labor from food production. For example, Porter and Philips-Horward (1997) observe that in 70% of the cases of sugar contract-farming in South Africa the principal farmer working all year round on the sugar cane plots is a woman. Sing (2002) reports that women end up working longer hours than men in

vegetable contract-farming schemes controlled by male farmers in the Indian Punjab. Eaton and Sheperd (2001) observe that in a large contract-farming scheme involving thousands of farmers in China women – while being completely excluded from signing contracts themselves – perform the bulk of the work related to contract-farming. They also report cases where contracted tobacco production in East Africa conflicts with the cultivation of millet and sorghum, basic food crops, by female farmers. Dolan (2001) argues that specifically the growth of high-value horticulture supply chains has been detrimental for rural women in Kenya because land and labor resources that were traditionally used by women to cultivate vegetables for home consumption and sale in local markets have been appropriated by men for export vegetable production under contract.

Other studies do not find conflicts over productive resources between high-value contract production controlled by men and basic food production by women, or that this reallocation of resources – especially female labor – leads to adverse food security effects and deteriorated child nutrition. On the contrary, Minten, Randrianarison and Swinnen (2009), although not explicitly addressing gender issues, find that high-value vegetable contract-farming in Madagascar leads to improved productivity for food (rice) production through technology spillovers, thereby improving the availability of food in the household and shortening the lean period or “hunger season”.

Our analysis from the French bean export sector in Senegal also suggests that gender conflict over land and labor resources is quite limited. Beans are exported from Senegal to the EU only during the off-season (from November till April) and households only allocate part of their land and labor resources to contracted bean production and only during a confined period which does not coincide with the main

“rainy” agricultural season when staple food crops and other subsistence crops are cultivated.

4.3. Intra-household control over income

The general pattern in modern supply chains is that women perform a large share of the work, either as family laborer on contracted plots controlled by men or as hired worker in the agro-industry. Yet, women’s control over income resources in the household is strongly correlated with women’s access to labor markets and paid employment (Quisumbing, and Mc Clafferty, 2006). Therefore, the way households benefit from modern supply chains, through product-market channels or labor market channels, and the way women are employed, as family farm-workers or as hired agro-industrial employees, has major implications for the intra-household control over the income derived from these activities.

As men are mostly the contractors that deal with the contracting firm, they also receive and therefore directly control the income derived from high-value contract-farming. Women performing the bulk of the work in high-value contract production as family laborer on the plots controlled by their husband and male siblings often do not reap the full benefits of their labor as family work is often unpaid or inadequately remunerated. The share of the income derived from contract-farming that is controlled by women depends on women’s bargaining power in the household. So, while contract-farming in general may be beneficial for producers, the benefits are largely controlled by men and are not directly awarded to female family farm workers. This has been empirically observed in several cases: for example in vegetable contract-farming in India (Sing, 2003) and in China (Eaton and Sheperd, 2001). Also Dolan (2001) in her case-study on Kenyan horticulture exports reports

that the intra-household resource conflict arising because of vegetable contract-farming mainly comes down to a conflict over the use of the increased income generated through contract-farming.

Contrarily, women employed in modern supply chains through off-farm wage work in the agro-industry benefit more directly. In this case women are themselves the “contracted party” in the labor agreement with the companies and directly receive the cash wages related to their labor. These wages earned by female household members outside the own family farm (and outside other family businesses) are not only received directly by the female workers themselves but are also more directly attributable to their labor (as compared to family work), which increases their bargaining power over that income (Zhang et al., 2004). Moreover, female wage income can add importantly to total household income, which might further improve the decision-making position of women in the household, benefit their economic independence and enhance their empowerment.

Figure 3 documents the importance of female-generated and -controlled wage income from modern supply chains in Senegal. Figure 3 presents total household income for the 12-month period prior to the survey from different sources including farming, wages from the horticulture agro-industry, other agricultural and non-agricultural wages, self-employment, and public and private transfers. We distinguish between male and female generated income for wage income and for income earned from non-farm self-employment¹⁰. An important share of the income derived from wages earned in the modern horticulture agro-industry pertains to women and these wages contribute importantly to total household income. In the *Niayes* area wages earned in the French bean export industry make up one third of household income for those households involved in agro-industrial employment and 85% of these wages

pertain to women. In the *Senegal River Delta* area 45% of the income derived from employment in the tomato export industry pertains to women while this agro-industrial employment has become the major source of income in the region. These figures indicate that the growth in modern supply chains has contributed importantly to increasing female-generated cash income in these regions.

4.4. Summary

The arguments and evidence reviewed here suggest that gender effects of the growth in modern supply chains differ depending on whether rural households participate through product markets or through labor markets. Women are likely to benefit less from contract-farming and product market effects as they are excluded from contracts and may not exert direct control over income generated from contract-farming while performing the bulk of the work on contracted plots as unpaid (or inadequately remunerated) family farm-workers. Women are likely to benefit more from the labor market effects of the growth in modern supply chains as labor contracts with the modern agro-industry includes women, often disproportionately, and the income derived from these contracts is more directly controlled by women.

5. The effect of modern supply chains on rural labor markets

5.1. Feminization of the rural labor force

The discussion above reveals that the growth in modern supply chains in developing countries has been associated with growing female employment in the emerging rural agro-industries and important contributions of female wages to household income. These labor market effects of modern supply chains are specifically important because off-farm employment opportunities for rural women in

developing countries are often lacking while female wage employment is positively associated with women's wellbeing and broader development goals. The extent to which modern supply chains contribute to the feminization of the rural labor force and raising women's off-farm employment opportunities is therefore an important concern.

Based on our household survey data for Senegal, we can measure the importance of the observed gender and labor market effects. First, we find that in both study regions almost one third of rural households have women who are currently employed in the FFV agro-industry (figure 4). In the *Niayes* area female employment in the French bean agro-industry increased from less than 10% of local households in 1999 (before the largest companies moved away from smallholder contract-farming and started their own integrated production) to more than 30% of households in 2005. Similarly, in the *Senegal River Delta* area the share of households having female members employed in the tomato export industry increased sharply after 2001 (when tomato export activities in this region started) and reached about 30% in 2006. In this case male employment is almost as high as female employment while in the *Niayes* region male employment in the horticulture agro-industry represents less than 5% of households.

Second, apart from the emerging modern agro-industry, off-farm employment opportunities for women are found to be very limited. More than 90% of women employed in the FFV agro-industry in the *Niayes* region indicate that before they started this agro-industrial employment they had never been working outside the home and the household farm. Similarly, in the *Senegal River Delta* area only 11% of households have female household members working as off-farm wage laborer outside the tomato export industry (compared to 22% for male household members).

This is also reflected in the income figures presented in figure 3. In both research regions the wages earned in the agro-industry are much more important than any other type of income from off-farm and non-farm activities, and this is especially so for female income.

5.2. Gender discrimination in rural labor markets

Gender discrimination

Despite the fact that wages earned by women might contribute importantly to household income, increase their economic independence and foster further development goals; critics on the feminization of labor markets argue that labor markets themselves are bearers of – and even reinforce – gender inequality (e.g. Casale, 2004; Barrientos et al., 2003). Gender discrimination in labor markets most importantly comes from wage differences between male and female workers but also from differences between men and women in job security, working conditions, type of contracts, etc. These issues have been researched most intensively in urban labor markets and manufacturing sectors – and are not confined to developing countries. Some studies also find evidence of lower wage rates for women compared to men in rural off-farm jobs in developing countries (e.g. Canagarajah et al., 2001; Lanjouw and Feder, 2001).

Previous studies on high-value horticulture production in also indicate that these supply chains contribute to gender inequality because of discriminatory practices in the labor market (e.g. Barrientos, Mc Clennegan and Orton, 2000; Barrientos, Dolan and Tallontire, 2001 & 2003; Barrientos and Kritzing, 2004). Based on interviews with agro-industrial workers in horticulture supply chains in Kenya, South-Africa and Zambia, Barrientos, Dolan and Tallontire (2001, 2003) claim that women have lower wages than men; that women have temporary, seasonal

and casual jobs while men hold the fewer permanent jobs; that women are more often unemployed during the winter months than men; and that female employment is characterized by longer hours, no social protection, job insecurity, informal relations and poor working conditions. They conclude that in the African horticulture agro-industry firms shift the risk of production onto female workers through adjustment of employment levels and driving down employment costs of flexible, informal and low-paid female labor.

These assertions differ mostly with our findings from Senegal. Based on our survey of hundreds of workers in both the French bean and the cherry tomato agro-industry, table 2 summarizes some characteristics of the working conditions for male and female workers in both supply chains, including their average daily wages. First, in the tomato export industry in the *Senegal River Delta* area there appears to be some gender bias in the allocation of permanent positions in favor of males: 28% have permanent positions while this is only 2% among female employees. However, in all other aspects we do not find female discrimination. There are very few male employees in the French bean agro-industry in the *Niayes* region and these male employees are – just as the female employees – all casual or temporary workers¹¹.

Second, we find no significant differences in the daily wages of female and male temporary employees in neither of the case-studies. We even find that female wages are somewhat higher than male wages in the *Niayes* case-study – on average 1,365 FCFA per day versus 1,197 FCFA day – but the difference is not significant. However, permanent employees have wages that are 70% higher than those for temporary and casual laborers. This indicates that differentials in wages relate to differences in the type of employment and associated differences in responsibilities within the job rather than to gender discrimination.

Third, we find that among temporary employees women are working on average around 5.5 months per year in the horticulture agro-industry while for men this is slightly higher (about 7 months). These observed differences are less pronounced than previous observations in the literature and are not necessarily related to the use of female casual labor for low-cost flexible labor adjustment by agro-industrial firms – as put forward by Barrientos, Dolan and Tallontire (2003). An alternative explanation is that women themselves choose to allocate their labor to off-farm employment more flexibly in correspondence with household chores. In both Senegal case-studies we observe that several women of the same household¹² often take turns in working in the agro-industry and staying at home for housekeeping and child care.

In summary, our data show that while in one case there is some gender bias in the allocation of permanent positions versus casual jobs there is no other evidence of wage differentials between male and female agro-industrial employees in high-value supply chains. This is an important finding as the available empirical evidence indicates that in general rural labor markets do entail gender discrimination in wages (e.g. Canagarajah et al., 2001; Lanjouw and Feder, 2001).

Ethical standards

A possible explanation for labor markets in modern supply chains to be more gender-neutral than rural labor markets in general relates to the use of high standards in these supply chains. As mentioned before high-value supply chains are governed through stringent public and private standards, including ethical standards and codes of conduct that are meant to improve poor working conditions and abolish gender (and other types of) discrimination. There is a difference in the degree to which private certification schemes incorporate such ethical standards. For example ETI

(Ethical Trade Initiative) includes provisions on ethical codes of conduct – including provisions on forced labor, child labor, gender and racial discrimination, freedom of association, working hours, labor contracts, living wages, etc. – while EurepGAP certification concentrates on food quality and safety standards, and does not explicitly stipulate codes of conduct and refers to national legislation for certain ethical issues such as working hours and minimum wages. Although it has been argued that the effectiveness of codes of conduct in improving (female) workers' conditions is limited¹³ (Barrientos et al., 2003), compliance with stringent ethical standards and certification schemes such as ETI might reduce gender discrimination in high-standards supply chains and improve working conditions and wages. Compliance with stringent ethical standards might contribute to explaining the observation that in our Senegal studies daily wage rates in the tomato agro-industry – controlled by one multinational company that is ETI certified – are 20 to 40% higher as compared to the French bean export industry where no explicit ethical standard is used (table 2).

5.3. Summary

The growth in modern supply chains in developing countries has been associated with an increased feminization of rural labor markets. While this is in itself a positive gender development, questions remain concerning gender discrimination in these rural labor markets and the role of ethical standards in improving women's labor conditions and removing potential discrimination. Our survey results indicate a more positive gender picture in this respect than the rest of the literature.

6. Conclusions and unresolved issues

In this paper we revised the literature on gender aspects of the growth of modern supply chains, and identified the direct mechanisms through which women benefit. We used survey data from Senegal to quantify various effects. A key result from our Senegal studies is that the growth in high-value agricultural production and the emergence and spread of modern supply chains across developing countries is associated with direct beneficial effects for rural women and reduced gender inequalities in rural areas. This result contradicts much of the literature which claims modern supply chains entail detrimental gender effects.

Other important insights from our analysis is that women benefit more and more directly from large-scale estate production and agro-industrial processing, and the creation of employment in these modern agro-industries than from high-value smallholder contract-farming. Along with similar results on the poverty effects of modern supply chains (e.g. Maertens and Swinnen, 2009; Maertens et al., 2008; McCulloch and Ota, 2001) this finding suggests that modern supply chains can be more effective in assuring that the benefits from high-value production and trade are more equally shared among the rural poor and rural women when supply chains are based on agro-industrial production and hired labor rather than on smallholder contract-farming and family labor. Nevertheless it is mainly smallholder contract-farming that has been promoted in policy attempts to assure an equitable distribution of the gains from high-value agricultural trade and of the rents in modern food supply chains. If one is serious about the development of high-value agricultural trade as a strategy for poverty alleviation and inequality reduction, there is a need for integrating insights on labor market effects of modern supply chains, including gender aspects, in policy thinking.

An important question is whether the differences in findings from our studies with the rest of the literature reflect actual differences in effects or differences in the methodology and analytical framework used. There is much room for additional research to address this issue. Based on the review and analysis in this paper we can identify several additional unresolved issues where conclusive empirical evidence is still lacking, or where complex causal links of direct and indirect effects are not completely understood yet. First, there is mixed evidence on whether high-value contract-farming results in resources being shifted away from basic food production and it is unclear what the ultimate effects are in terms of food security and child nutrition. If income effects of high-value contract-farming are large, the reallocation of productivity resources away from subsistence production does not necessarily reduce the availability of food at the household level. In addition, there might be spillover effects from high-value contract-farming on other farm activities that ultimately result in increased food production, for example through increased access to inputs, improved cash flows, and technology spillovers.

Second, there is very little evidence on whether, next to employment effects in the emerging agro-industries, modern supply chains entail indirect labor market effects through an increased demand for hired labor on contracted smallholder farms. If such indirect labor market effects exist, their implications in terms of female participation and gender discrimination is a potentially important issue as well.

Third, the allocation of female labor to rural off-farm wage labor in emerging modern agro-industries might have indirect effects on the allocation of household resources. On the one hand, the wage income generated by women might increase their decision power in the household. On the other hand, resources, including land, household labor and the claim on income from other household farm and non-farm

activities, might be taken away from women working outside the home and the family farm. In addition, while female income is positively related with spending on children's education, the feminization of rural labor markets might have adverse effects on the schooling of girls if they withdraw from school either to participate in the labor market or to replace their mothers in household maintenance and child care activities.

Fourth, there is a need for more empirical evidence on issues of gender discrimination in rural labor markets. An unresolved issue is whether modern supply chains that are governed through high standards, including labor standards, perform better in this respect than more traditional chains, where often no labor standards are used or enforced.

On all these issues more research is needed to obtain insights which are based on carefully developed empirical evidence instead of unsupported intuitive reasoning.

¹ The share of developing countries in total exports of high-value non-traditional commodities has increased 21% in 1980 to 41% in 2000 (Aksoy and Beghin, 2005).

² For example, in our analysis we focus only on the supply side effects and ignore direct consumption effects of modern marketing chains. We believe that this is a reasonable approach in this first attempt to better understand gender implications of modern supply chains but one should bear in mind that consumption effects might be important, e.g. by improving access to a wider variety of products (Minten and Reardon, 2008).

³ An overview of different governance systems in modern supply chains is given in Dirven (1996) for Latin America and in Swinnen (2005) for Eastern Europe and the Former Soviet Union.

⁴ Contracting is defined here in a broad sense and can mean an oral short-term agreement as well as a signed formal contract extending over a longer period of time.

⁵ For more information on sampling design and survey strategy see Maertens and Swinnen (2009) and Maertens et al. (2008). To draw correct inferences from stratified samples we use sampling weights that are calculated as the inverse of the probability of a household in a specific rural community to be selected in the sample using additional information from a village census in all selected villages.

⁶ See Maertens, Colen and Swinnen (2008) for more details on the cherry tomato supply chain in Senegal.

⁷ See Maertens and Swinnen (2009) for more details on the French bean supply chain in Senegal.

⁸ This mostly concerns examples from small individual contract-farming schemes. For example Plantconsult (2003) reports a successful contract-farming scheme in the export vegetable sector in Kenya where the majority of the 160 smallholder farmers involved in the scheme are women.

⁹ Women's right over land is in many developing countries – including Senegal – limited to usufruct rights.

¹⁰ The data do not allow distinguishing between male and female income for income derived from the own farm and for transfers. In addition, farm input data are not detailed enough to distinguish income from contract-farming from other farm income.

¹¹ The lack of permanent employees in our sample is due to the fact that the exporting companies are all relatively small family-run companies where the permanent positions are filled by family members which are not included in our sample of rural farm-households.

¹² We need to note that our Senegal household samples concern extended households with on average 16 members. Also, almost half of the household heads in the samples (48%) have two or more wives.

¹³ The main arguments are that ethical standards fail to address the complex needs of informal workers, for whom the conditions of employment are often worst, and that the environment in which supply chain governance – including standards – is shaped is not gender neutral and fails to address women's reproductive work (Barrientos et al., 2003).

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Table 1: Employment in the horticulture export agro-industry in selected Sub Saharan African countries

Country	Commodity	Year of survey	Number of employees in the FFV agro-industry	Share of female employees
Cameroon	Banana	2003	10,000	
Cote d'Ivoire	Banana and pineapple	2002	35,000	
Kenya	Flowers	2002	40,000 - 70,000	75%
	Fruits & vegetables		2,000,000	
Senegal	French beans	2005	12,000	90%
	Cherry tomatoes	2006	3,000	60%
Uganda	Flowers	1998	3,300	75%
Zambia	Vegetables	2002/03	7,500	65%
	Flowers	2002/03	2,500	35%
South Africa	Decicuous fruit	1994	283,000	53%

Source: Arias (2003) for Cameroon; Minot and Ngigi (2004) for Cote d'Ivoire; own calculations from case-studies for Senegal; Smith et al. (2004) and Barrientos et al. (2001) for Zambia and flowers in Kenya; Jaffee (2003) and Lambert (2002) for fruits and vegetables in Kenya; Danson et al. (2004), and Barrientos et al. (2000) for South Africa.

Table 2: Employment conditions for female and male laborers in the FFV agro-industry in two case-study regions

		Case-studies			
		Les Niayes		Senegal River Delta	
		Female workers	Male workers	Female workers	Male workers
Number of workers in the sample		221	14	305	196
Share of workers					
	casual/temporary workers	100%	100%	98%	72%
	permanent workers	0%	0%	2%	28%
Daily wages (FCFA)					
temporary workers	(mean)	1,365	1,197	1,648	1,686
	(median)	1,225	1,050	1,700	1,700
permanent workers	(mean)			2,400	2,566
	(median)			2,400	2,400
# of months (temporary workers)	(mean)	5.32	7.64	5.59	6.51
	(median)	5	6.5	4	5.5

Source: Own calculations from household survey data

Figures

Figure 1. Conceptual framework on the direct gender-related effects of modern supply chains

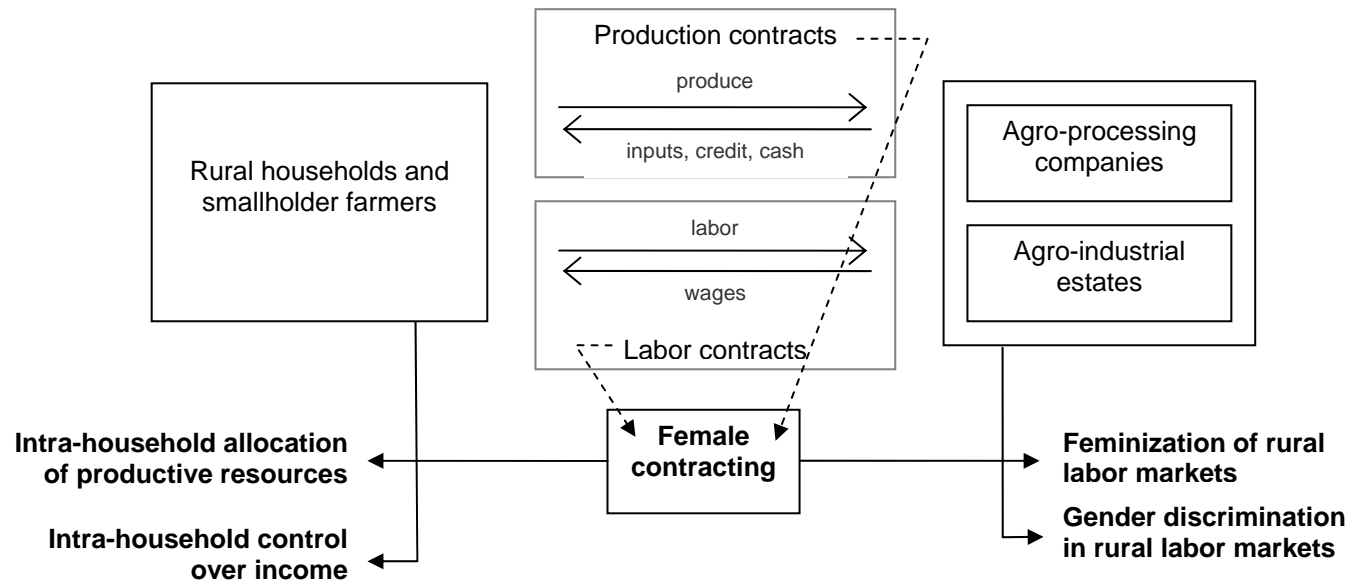
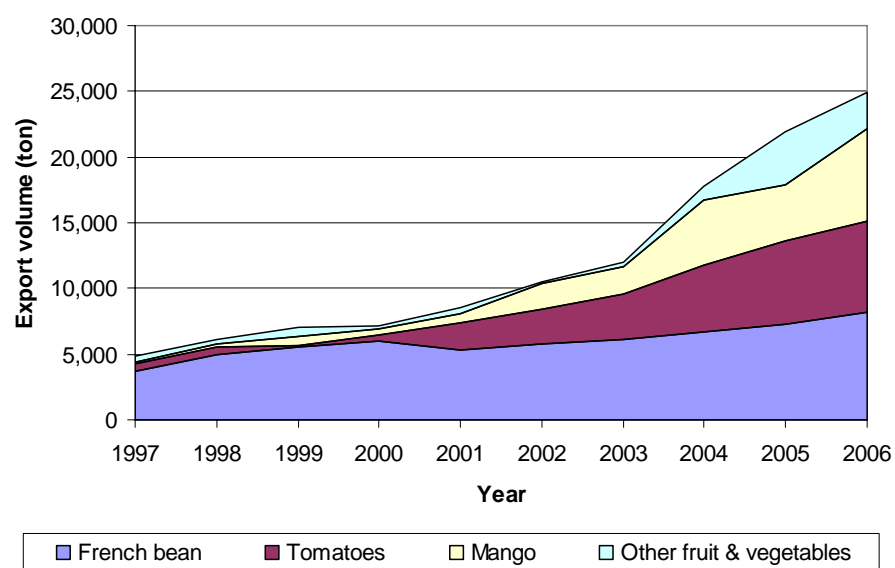
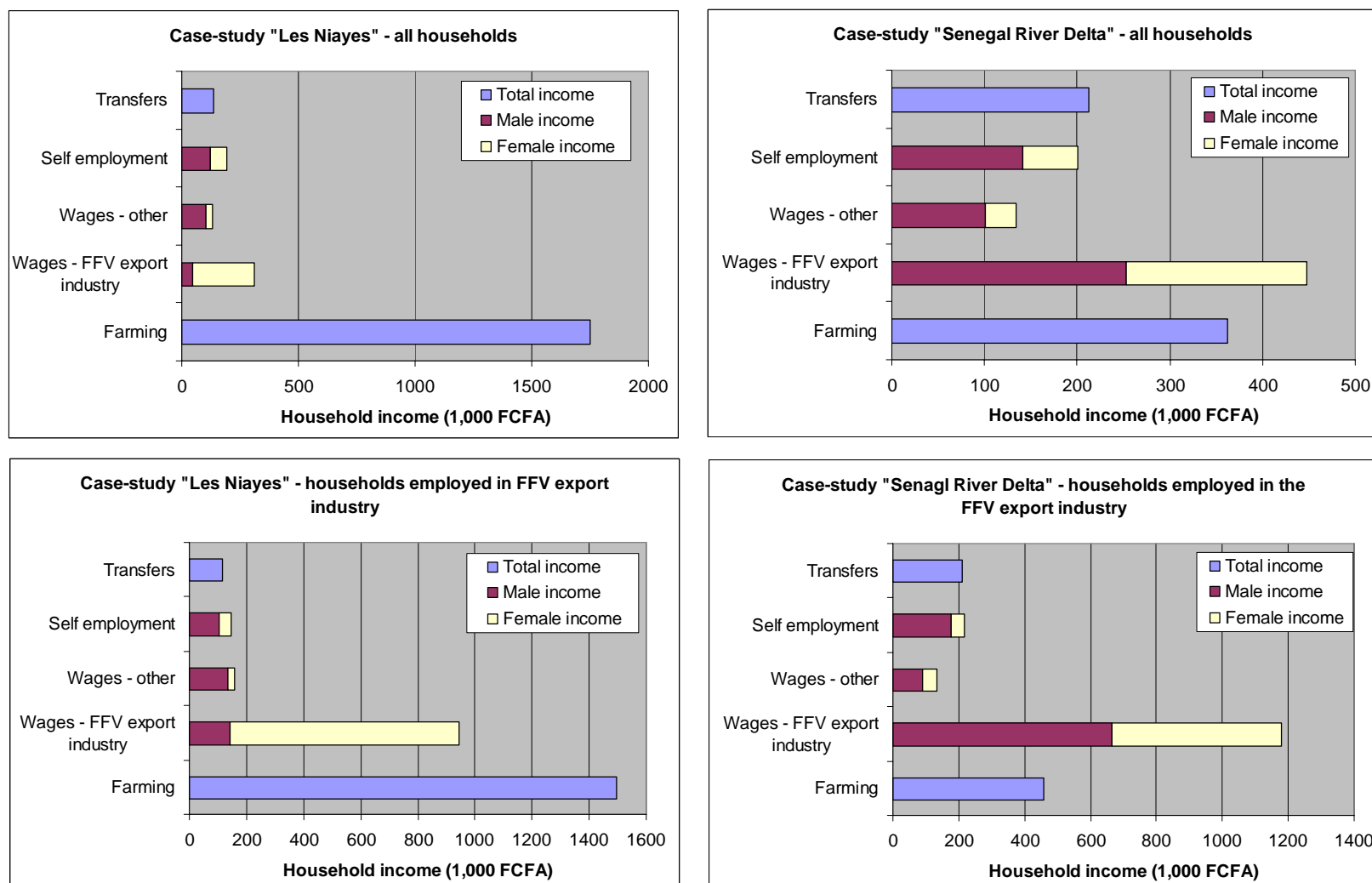


Figure 2. Horticulture exports (ton) from Senegal, 1997 – 2006



Source: Eurotrans – Senegal

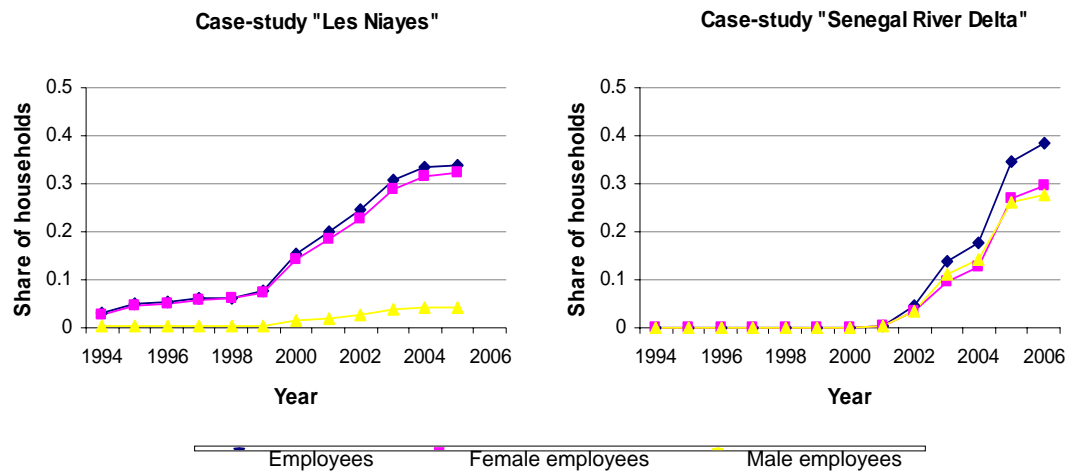
Figure 3: Sources of household income in two case-study regions in Senegal



Source: Own calculations from survey data

Household income is calculated as yearly income for the 12-month period prior to the survey. "Farming" includes income from cropping and livestock rearing and is calculated taking into account total production, the cost of variable inputs including hired labor, and the depreciation of machinery and equipment. "Wages-FFV export industry" includes income from wages earned in the French bean/tomato export agro-industry. "Wages-other" include income from all other wage employment. "Self-employment" includes income from non-farm family businesses and is calculated taking into account revenue, costs of variable inputs and depreciation of machinery and equipment. "Transfers" include public and private transfers such as subsidies and remittances.

Figure 4: Household participation in female and male employment in the horticulture agro-industry in two case-study regions in Senegal



Source: Own calculation from survey data